SUBCHAPTER 20 PARTICLE ACCELERATORS FOR INDUSTRIAL AND RESEARCH USE

7:28-20.1 Scope

(a) This Subchapter establishes requirements and procedures for the registration and use of all particle accelerators, with the exception of those regulated by N.J.A.C. 7:28-14 and 15.

(b) A person shall not operate or permit the operation of a particle accelerator unless the equipment and installation meet the applicable requirements of this subchapter.

(c) In addition to the requirements of this subchapter, all registrants of particle accelerators are subject to all other applicable requirements of N.J.A.C. 7:28-1 through 11 and 13.

7:28-20.2 Definitions

The following words and terms, when used in this subchapter, shall have the following meanings, unless the context clearly indicates otherwise:

"Direct supervision" means guidance and instruction by the qualified machine operator who is physically present, is watching the operation of the particle accelerator, and is available for immediate assistance;

"Electron microscope" means a machine that accelerates electrons for the purpose of producing highly magnified images of materials and material surfaces;

"kVp" means kilovolt peak;

"Particle accelerator" means any machine that accelerates charged particles (electrons, protons, deuterons, or other charged particles, etc.) in a vacuum and discharges the resulting particulate or other radiation but which does not meet the specifications of machines currently regulated under N.J.A.C. 7:28-14 through 16; particle accelerators include but are not limited to machines used for research, irradiation, or other purposes; such machines include, but are not limited to, potential-drop accelerators, electron linear accelerators, cyclotrons, betatrons, microtrons, ion implant accelerators, and electron microscopes; particle accelerators do not include high voltage generators, televisions, video display terminals, cathode ray tubes or other similar devices whose primary purpose is not the production of a useful charged particle beam;

"Particle accelerator facility" means the location at which one or more particle accelerators are installed and are operated under the same administrative control;

"Particle accelerator safety officer" or "PASO" means the person who is appointed and authorized by the registrant to act on the registrant's behalf to implement and maintain the particle accelerator radiation protection program for the registrant's facility;

"Performance test" means a procedure which is performed to assure that an instrument continues to perform its intended function;

"Qualified machine operator" means a person who meets the requirements of N.J.A.C. 7:28-20.6(a);

"Radiation protection committee" means a group consisting of at least three individuals appointed by the registrant who identify radiation safety problems, initiate, recommend, or provide corrective action plans, and verify the implementation of corrective actions. One member of this committee shall be the particle accelerator safety officer and one member shall be a representative of management. The remaining members shall be appointed at the discretion of the registrant;

"Scattered radiation" means radiation that, during passage through matter, has changed in direction or in energy;

"Stray radiation" means the sum of leakage and scattered radiation.

7:28-20.3 Registration requirements

A person shall not possess, control, use or cause a particle accelerator or an electron microscope to be used unless it has been registered with the Department pursuant to N.J.A.C. 7:28-3, unless the particle accelerator or electron microscope is incapable of operating at more than 5 kVp and does not produce radiation greater than 0.5 millirem per hour at any readily accessible point five centimeters from its surface.

7:28-20.4 General requirements for a particle accelerator facility

(a) Particle accelerators not capable of operating at more than 30 kVp shall be exempt from the requirements of (b) through (f) below and N.J.A.C. 7:28-20.5 through 20.12 provided that the initial or repeat radiation protection survey does not yield radiation levels greater than 0.5 millirem per hour using maximum operating conditions of operation as measured five (5) centimeters from any accessible surface.

(b) A registrant shall not permit a particle accelerator to be operated unless the person operating the particle accelerator has met the requirements of N.J.A.C. 7:28-20.6(a).

(c) A registrant shall not use a particle accelerator or cause it to be used unless the equipment, facilities, operating procedures and emergency procedures are adequate to minimize danger to property and to public health and safety.

(d) The registrant of a particle accelerator facility shall appoint a Particle Accelerator Safety Officer (PASO) who is authorized to act on behalf of the registrant to implement and maintain a radiation safety program for the particle accelerator facility. The PASO may be either a full-time employee of the registrant or a consultant hired by the registrant. The registrant shall hold the final responsibility for the safe operation of the facility in accordance with all pertinent provisions of this Chapter.

(e) A particle accelerator safety officer shall meet at least one of the following five criteria:

1. Certification in health physics by the American Board of Health Physics or certification in therapy physics and /or radiological physics by the American Board of Radiology;

2. A Bachelor's degree from an accredited college in biology, chemistry, radiation sciences, physics, engineering or mathematics and six years of professional technical experience in the field of radiological health or in a radiation protection activity. At least one year of the required health physics experience shall have been with a particle accelerator of a type similar to that with which the PASO will be working;

3. A master's degree in radiological health, radiation sciences, physics, chemistry, environmental sciences, engineering or a related field and at least five years of professional technical experience in the field of radiological health or in a radiation protection activity. At least one year of the required health physics experience shall have been with a particle accelerator of a type similar to that with which the PASO will be working;

4. A doctorate degree in radiological health, radiation sciences, physics, chemistry, environmental sciences, engineering or a related field plus four years of professional technical experience in the field of radiological health or in a radiation protection activity. At least one year of the required health physics experience shall have been with a particle accelerator of a type similar to that with which the PASO will be working; or

5. Ten years of professional technical experience in the field of radiological health or in a radiation protection activity. At least five years of the required health physics experience shall have been with a particle accelerator of a type similar to that with which the PASO will be working.

(f) A particle accelerator safety officer in a facility where the particle accelerators are only electron microscopes shall comply with the requirements set forth in subsection (e) above or shall have received a bachelor's degree from an accredited college in a biological or physical science and shall have passed at least one course in radiation safety offered by an accredited college.

(g) The registrant of a particle accelerator shall appoint a radiation protection committee whose approval shall be required for implementation of procedures for the use of each particle accelerator. The PASO shall be a member of this committee.

7:28-20.5 Use of particle accelerators on humans

(a) A registrant shall not use a particle accelerator or cause it to be used for the intentional irradiation of humans without first sending to the Department a written request stating the registrant's reasons for this use of the particle accelerator and the manner in which it will be used, and obtaining written approval from the Department.

(b) A registrant shall not use a particle accelerator or cause it to be used for the intentional irradiation of humans unless the equipment meets the requirements of this subchapter and N.J.A.C. 7:28-14.

7:28-20.6 Training program on the safe use of each particle accelerator

(a) The registrant shall establish and maintain a training program on the safe use of each particle accelerator. The registrant shall not permit any person to operate the particle accelerator until that person has successfully completed the training program consisting of the ten items set out below. The registrant shall ensure that the training program is conducted under the direction of the PASO, or an individual with equivalent qualifications, in conjunction with the qualified machine operator and that the program shall include all of the following:

1. Instruction in the types, characteristics, location, and levels of radiation produced by the particle accelerator;

2. Instruction in the units of radiation exposure, dose, dose equivalent, and quantity of radioactivity associated with the particle accelerator;

3. Instruction in the biological effects of ionizing radiation;

4. Instruction in the methods used to prevent radiation exposure at the particle accelerator facility, including, but not limited to, time, distance, shielding, interlock system, safety procedures and radiation monitoring equipment;

5. Instruction in the use and care of personnel monitoring equipment employed at the particle accelerator facility;

6. Instruction on the location and use of all operating controls for the particle accelerator;

7. Instruction on the requirements of this subchapter and N.J.A.C. 7:28-1 through 11 and 13;

8. Instruction in the facility's written operating and emergency procedures;

9. An examination testing the operator's knowledge of the requirements of 1 through 8 of this subsection. The examination shall be of sufficient depth to

demonstrate that the operator has received instruction in each of the items listed above and has an understanding of the items at a level which permits the operator to use the particle accelerator in a manner consistent with the overriding goal of minimizing danger to public health and safety; and

10. At least 100 documented hours of on-the-job training under the direct supervision of a qualified machine operator and certified in writing by the PASO. The registrant shall maintain this documentation and certification for five years at the particle accelerator facility. These records shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request. If, in the opinion of the PASO, the requirement of 100 hours of on-the-job training is too stringent for a particular particle accelerator, then the PASO shall submit a report documenting the number of hours of on-the-job training needed to become a qualified operator to the Department for approval.

(b) The registrant shall require each operator to become requalified not less than once every three years by completing a refresher training course covering the requirements of (a) 1 through 9 of this section. The registrant shall maintain a record of each individual's completion of the refresher training course for five years at the particle accelerator facility. These records shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

(c) A registrant may permit a person to function as an operator's assistant under the direct supervision of a qualified machine operator until that person has completed a training course covering the requirements of (a)1 through 10 of this section.

(d) The registrant shall maintain records of the operator's training program, including a copy of the examination, for at least five years at the particle accelerator facility. These records shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

(e) Prior to operation of any particle accelerator after February 3, 1992, the registrant shall document in writing the name of each individual who operated a particle accelerator prior to February 3, 1992 and whom the PASO and the Radiation Protection Committee have certified as the first qualified machine operator for each particle accelerator. The registrant shall maintain this documentation for five years at the particle accelerator facility and shall produce it for review by the Department during an inspection. After February 3, 1992, an individual is required to complete all items in (a) above in order to become a qualified machine operator.

(f) When a new particle accelerator facility commences operation or places into operation a newly invented particle accelerator, the PASO and the Radiation Protection Committee shall document in writing the name and qualifications of

the individual whom they have certified as the first qualified machine operator. Any subsequent machine operator shall be subject to the provisions of subsection (a) of this section.

7:28-20.7 Shielding design and radiation area survey requirements for a particle accelerator

(a) A person shall consult with an individual with qualifications equivalent to those specified in N.J.A.C. 7:28-20.4(e) with respect to the health physics considerations in the design of a particle accelerator installation. The original record of this consultation, including the shielding design, shall be maintained at the particle accelerator facility for the life of the unit and shall be produced for review by the Department during an inspection and a copy submitted to the Department along with the registration form. This section shall apply to those particle accelerators planned for installation after the effective date of this subchapter.

(b) A registrant shall not install a particle accelerator unless such unit is designed and constructed with primary and/or secondary protective barriers as are necessary to comply with the permissible dose rates, radiation levels and concentrations specified in subchapter 6 of this chapter.

(c) A registrant shall ensure that a radiation survey of controlled areas and of adjacent areas is performed by the PASO or by a qualified individual under the supervision of the PASO to ensure that radiation exposure of individuals conforms to the requirements of subchapter 6 of this chapter, and an inspection is performed of the health physics aspects of the facility when the particle accelerator is first capable of producing radiation, but before the particle accelerator is used for any purpose other than installation or assembly of the particle accelerator, or the conducting of radiation surveys and health physics inspections.

(d) The registrant shall ensure that a written report of the radiation survey and health physics inspection is prepared by the PASO or by a qualified individual under the supervision of the PASO for review by the registrant. The registrant shall maintain these reports for the duration of the life of the machine at the particle accelerator facility.

(e) Prior to operation of the particle accelerator the registrant shall implement or cause to be implemented the recommendations listed in the radiation survey and health physics report, including any special limitations which are necessary to comply with the requirements of this chapter. The registrant shall ensure that a follow-up radiation area survey of controlled areas and of adjacent areas is performed by the PASO or by a qualified individual under the supervision of the PASO and a follow-up health physics inspection is conducted to ensure that the recommendations as implemented meet the requirements of this chapter. The registrant shall ensure that a written report of the follow-up radiation survey and

the follow-up health physics inspection is prepared by the PASO or under the supervision of the PASO for review by the registrant.

(f) The registrant shall submit a copy of the radiation survey and health physics inspection report required by subsection (d) and (e) of this section to the Department within 30 days of the date of the survey and health physics inspection report, and shall maintain the original radiation survey and health physics inspection report for the duration of the life of the machine at the particle accelerator facility. The radiation survey and health physics inspection reports shall be produced for review by the Department upon request.

(g) The requirements of subsection (c) of this section shall be followed when changes have been made in shielding, operation, equipment, or occupancy of adjacent areas which could affect radiation exposure of any individual and at intervals not to exceed one year.

(h) The registrant shall maintain at least two radiation survey instruments suitable for measuring all levels and energies of radiation capable of being produced by the particle accelerator. At least one of these radiation survey instruments shall be calibrated, operable, and easily accessible at the facility for use at all times.

(i) A registrant shall not use or cause a radiation survey instrument to be used unless:

1. A performance test is conducted on the survey instrument prior to each day's use;

2. The survey instrument is calibrated at intervals not exceeding one year using a nationally recognized calibration criteria;

3. The survey instrument is recalibrated each time it is serviced or repaired. If the service involved only a battery replacement, the survey instrument does not have to be recalibrated; and

4. The calibration procedure has been performed by a qualified individual using nationally recognized calibration procedures which conform to those of the National Institute of Standards and Technology. These procedures shall identify the calibration source used. Results of each calibration of the survey instrument shall be maintained at the particle accelerator facility for five years. The record of these results shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

7:28-20.8 Particle accelerator controls and interlock systems

(a) A registrant shall not operate or cause a particle accelerator to be operated unless each personnel entrance into a particle accelerator's high radiation area or exclusion area has been provided with the safety features listed below:

1. Clearly identified and easily discernible instrumentation, readouts and controls pertinent to the production of radiation;

2. A clearly identifiable switch on the accelerator control console which requires a positive, intentional action on the part of the operator for routine use in turning the particle accelerator beam on and off;

3. A personnel safety interlock system designed with a personnel safety interlock circuit. The personnel safety interlock system shall include a visual search procedure to clear personnel from the controlled area and high radiation areas prior to the production of radiation;

4. Personnel safety interlocks on all entrances into a controlled area and other high radiation areas that automatically terminate the production of radiation upon entry;

5. Circuitry such that when a safety interlock has been tripped, it shall only be possible to resume operation of the particle accelerator by manually resetting the controls, first at the position where the interlock has been tripped, and thereafter at the main control console;

6. Circuitry such that each personnel safety interlock shall allow its individual operation independent of all other interlocks;

7. Safety interlocks designed with fail-safe characteristics so that any defect or component failure in the interlock system prevents the production of radiation; and

8. A clearly identifiable emergency radiation cutoff switch shall be located in all high radiation areas and at the control console. Each cut-off switch shall include a manual reset switch so that the particle accelerator cannot be restarted from the accelerator control console without resetting the cut-off switch.

(b) A registrant shall not cause or allow a person to bypass intentionally an interlock which permits the production of radiation, unless such bypass fulfills all of the following conditions:

1. It is authorized for and limited to a specified time period by the radiation protection committee or PASO in writing prior to the bypass;

2. It is recorded in a permanent log;

3. It is accompanied by the posting of a prominent notice at the particle accelerator control console and at each personnel entrance being bypassed; and

4. It is terminated as soon as the need for the by-pass no longer exists as determined by the PASO.

7:28-20.9 Warning devices

(a) A particle accelerator shall not be operated unless the registrant has equipped all locations designated as high radiation areas and all entrances to such locations with clearly observable warning lights that operate when, and only when, radiation is being produced, and which shall be labeled to indicate that, when lit, radiation is being produced. The warning lights shall be included in the electrical circuitry of the particle accelerator such that when a warning light is not lit radiation cannot be produced in any area where personnel may be present.

(b) A particle accelerator shall not be operated unless the registrant has provided in each high radiation area audible and visual warning devices which shall be interlocked and activated for at least 30 seconds prior to production of radiation by the particle accelerator. Such warning devices shall be clearly discernible and labeled as to their function. The audible warning device alarm may be terminated once the high radiation area has been secured. Particle accelerator facilities designed and approved for human exposure are excluded from this requirement.

(c) A particle accelerator shall not be operated unless the registrant has identified barriers, temporary or otherwise, and pathways leading to high radiation areas in accordance with the labeling, posting and control requirements of N.J.A.C. 7:28-10.

7:28-20.10 Operating procedures

(a) A registrant shall not operate or permit the operation of a particle accelerator unless all of the following requirements have been met:

1. The particle accelerator is equipped with a means (such as, but not limited to, a locked console or a locked room) to prevent its unauthorized use;

2. The safety interlock system is not used to turn off the particle accelerator beam except in an emergency or for testing the operation of the interlock;

3. The operation of all safety and warning devices, including interlocks, is tested by the qualified machine operator and the test results recorded at intervals not to exceed 30 days and such testing is verified in writing by the PASO at intervals not to exceed 90 days; each safety and warning device shall be listed

separately in a log in which the test results are recorded; the log shall be maintained for five years at the particle accelerator facility and shall be produced for review by the Department during an inspection;

4. Electrical circuit diagrams accurately reflecting the current status of the particle accelerator and the associated interlock systems are available to the operator and for inspection by the Department. The electrical circuit diagrams shall be reviewed and/or revised at intervals not to exceed one year by the qualified machine operator and the PASO shall verify in writing at intervals not to exceed one year that the review and/or revision was performed; the registrant shall maintain a record of such review for five years at the particle accelerator facility, and the record shall be produced for review by the Department during an inspection;

5. A copy of the current operating and emergency procedures is prepared under the direction of the PASO and maintained at the particle accelerator control panel. These operating and emergency procedures shall be reviewed and/or revised under the direction of the PASO at intervals not to exceed one year. The registrant shall maintain a record of such review with the current operating and emergency procedures at the accelerator facility for the life of the particle accelerator. This record shall be produced for review by the Department during an inspection; and

6. The written operating and emergency procedures address the methods used to prevent radiation exposure at the particle accelerator facility. The procedures shall include, but not be limited to, the following topics:

   i. The location and operation of the interlock systems;
   ii. The safety procedures that apply to each particle accelerator;
   iii. The types and use of personnel monitoring equipment;
   iv. The procedures and personnel requirements for changing the target;
   v. The handling and disposal procedures for disposing of a target;
   vi. The procedures for surveys and wipe tests; and
   vii. The emergency procedures regarding personnel and machine operations applicable to each particle accelerator.

7:28-20.11 Radiation area and personnel monitoring requirements

(a) The registrant shall identify in writing all types of radiation that will be produced, both primary and secondary, by the particle accelerator and the monitoring equipment selected to measure all the corresponding types and energies of radiation levels. The registrant shall maintain these records at the particle accelerator facility for five years. These records shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

(b) The registrant shall continuously monitor the radiation levels in or at the entrance to all high radiation areas. The area monitoring devices shall have fail-safe characteristics and shall be capable of providing a remote and local readout with visual and/or audible alarms at the accelerator control panel, any entrance to high radiation areas, as well as at other appropriate locations determined by the PASO so that a person entering the high radiation area or present therein becomes aware of the existence of the hazard.

(c) The registrant shall have all area monitors calibrated at intervals not to exceed twelve months and after each servicing and repair according to written procedures established by the PASO. The calibration procedures and records shall be maintained for five years at the particle accelerator facility. These procedures and records shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

(d) If the PASO has identified airborne particulate radiation as a primary or secondary product of a particle accelerator as required pursuant to (a) above, then surveys shall be performed by the PASO or other qualified individual under the supervision of the PASO at least once in each quarter of the calendar year to determine that the amount of airborne particulate radioactivity present in controlled areas is in compliance with N.J.A.C. 7:28-6. Where survey results indicate noncompliance with N.J.A.C. 7:28-6, use of the particle accelerator shall be immediately discontinued and remedial measures to bring the particle accelerator into compliance with N.J.A.C 7:28-6 shall be taken. Use of the particle accelerator is prohibited until such time as new surveys show that compliance with N.J.A.C. 7:28-6 has been achieved. The results of the surveys shall be maintained for five years at the particle accelerator facility. Survey results shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

(e) If the PASO has identified removable contamination as a primary or secondary product of a particle accelerator as required pursuant to (a) above, then wipe tests shall be performed by the PASO or other qualified individual under the supervision of the PASO upon initial use of the particle accelerator and, thereafter, at least every six months to determine the degree of removable contamination in the target area and other pertinent areas to ensure compliance with N.J.A.C. 7:28-9. Where wipe test results indicate noncompliance with N.J.A.C. 7:28-9, use of the particle accelerator shall be immediately discontinued and remedial measures to bring the particle accelerator into compliance with N.J.A.C. 7:28-9 shall be taken. Use of the particle accelerator is prohibited until such time as new wipe tests show that compliance with N.J.A.C. 7:28-9 has been achieved. The results of the wipe tests shall be maintained for five years at the particle accelerator facility. Wipe test results shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

(f) Surveys shall be made by the PASO or other qualified individual under the supervision of the PASO upon initial use of the particle accelerator and, thereafter, not less than once annually, to determine the levels of radiation resulting from activation of the target and other pertinent areas to determine compliance with N.J.A.C. 7:28-6 and 9. Where test results indicate noncompliance with N.J.A.C. 7:28-6 and 9, use of the particle accelerator shall be immediately discontinued and remedial measures to bring the particle accelerator into compliance with N.J.A.C. 7:28-6 and 9 shall be taken. Use of the particle accelerator is prohibited until such time as test results show that compliance with N.J.A.C. 7:28-6 and 9 has been achieved. The results of the surveys shall be maintained for five years at the particle accelerator facility. Surveys shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

(g) The PASO shall develop procedures for performing surveys and wipe tests required by (d), (e), and (f) above. These procedures shall be in writing and shall be kept at the particle accelerator facility. These procedures shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request. The survey and wipe test procedures shall contain, but shall not be limited to, the instrumentation to be used in conducting surveys and wipe tests, the method of performing the survey and wipe test (for example, points on the equipment from where wipe samples will be taken and method of obtaining the wipe sample), and method of calculation of survey and wipe test results.

(h) The registrant shall supply all individuals with and shall require these individuals to use and wear appropriate personnel monitoring equipment as listed below when entering the area which has been defined as a high radiation area while the particle accelerator is in operation:

1. Direct reading dosimeters capable of measuring doses from zero to one roentgen measured in milliroentgen increments and provided with an audible indicator discernible above the ambient noise level; the direct reading dosimeter shall be read daily and doses shall be recorded in a log book; and

2. Portable radiation survey instruments capable of measuring the maximum radiation levels anticipated to be present at the facility and provided with an audible indicator discernible above the ambient noise level.

(i) The registrant shall ensure that the PASO assigns appropriate personnel monitoring equipment to each individual who works with the particle accelerator and that the use of such personnel monitoring equipment meets the requirements of N.J.A.C. 7:28-7.

(j) The registrant shall immediately confirm the radiation level measured by a personnel monitoring device if a direct reading dosimeter indicates exposure greater than 200 milliroentgens.

(k) The registrant shall maintain the personnel monitoring reports and the daily log records of the direct reading dosimeter values at the particle accelerator facility to insure compliance with N.J.A.C. 7:28-8. These records and logs shall be produced for review by the Department during an inspection and shall be submitted to the Department upon request.

7:28-20.12 Ventilation systems

The registrant of a particle accelerator shall ensure that the maximum permissible average concentration of radioactive materials in air and water shall be as specified in N.J.A.C. 7:28-6 and the concentration of radioactive materials in effluents from the controlled areas shall meet the requirement of N.J.A.C. 7:28-11.

7:28-20.13 Electron Microscopes

(a) Electron microscopes shall be exempt from the requirements of N.J.A.C. 7:28-20.4 through 7:28-20.12 except for the following requirements:

1. The registrant shall not use or cause an electron microscope to be used unless a radiation protection survey has been performed by an individual under the supervision of the PASO as defined in N.J.A.C. 7:28-20.4 to ensure compliance with N.J.A.C. 7:28-5 and 7 before the electron microscope is put into operation; the registrant shall submit a copy of the survey report to the Department within 30 days of the date of the survey and shall maintain the original survey report at the electron microscope facility; the survey report shall be produced for review by the Department during an inspection;

2. The electron microscope shall be resurveyed after every repair, modification, or relocation that would affect radiation exposure; the registrant shall submit a copy of the survey report to the Department within 30 days of the date of the resurvey and shall maintain the resurvey report at the electron microscope facility; the resurvey shall be produced for review by the Department during an inspection.

3. The registrant shall ensure that the electron microscope operating parameter indicators and controls pertinent to the production of radiation are clearly identified and easily discernible; the electron microscope shall be provided with a clearly visible label bearing the conventional radiation symbol and the words CAUTION: THIS EQUIPMENT PRODUCES X-RAYS WHEN ENERGIZED or other words having equivalent meaning affixed on the column.

4. The registrant shall provide each electron microscope operator with appropriate personnel monitoring equipment as required by N.J.A.C. 7:28-7 and require that the device be worn by each individual during operation of the electron microscope.

    i. The registrant shall ensure that the personnel monitoring reports received from the personnel monitoring device processor contain the information required in N.J.A.C. 7:28-8; and

    ii. The personnel monitoring reports received from the personnel monitoring device processor shall be maintained for inspection by the employee and the Department pursuant to the requirements of N.J.A.C. 7:28-8.

(b) Electron microscopes incapable of operating at 30 kVp or above shall be exempt from the requirements of N.J.A.C. 7:28-20.13(a)4 provided the initial or repeat radiation protection survey does not yield radiation levels using maximum conditions of operation as measured at five centimeters from any accessible surface greater than 0.5 millirem per hour.

(c) The registrant shall provide a means to secure the electron microscope to prevent unauthorized use when not in operation. Such means may include, but are not limited to, a locked console or locked room.